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CLAIMS

[Claim(s)]

[Claim 1]A PTC device covering the surface with polyparaxylylene system resin except for a lead takeoff connection of metal leads in a metal plate and a PTC device which laminates metal leads to up-and-down both sides of a PTC element.

[Claim 2]A composition cell provided with a PTC device connecting between cells a PTC device which covered the surface with polyparaxylylene system resin except for a lead takeoff connection of metal leads in a metal plate and a PTC device which laminates metal leads to up-and-down both sides of a PTC element.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to the composition cell provided with the PTC device and the PTC device.

[0002]

[Description of the Prior Art]Conventionally, an over-current, The energization in which what is a resistor of tens milli ohms in a normal state is unusual from the outside as for the PTC device constituted by sticking by pressure the metal plate which connected metal leads to the PTC element (POSITIVE TEMPERATURE COEFFICIENT) which is a heating protective element, When it becomes a tens of ohms resistor by a rise in heat in the inside of a short time and external load changes into a normal state, it has the feature which returns to the original low resistance object. The thickness of PTC element 1 in order to maintain low resistance, as shown in drawing 1 as a structure of a PTC element For this reason, about 15-40micro, The thickness of the metal plate 2 was about 30-100micro, it covered with the insulating resin 4 grade except for the lead takeoff connection of the metal leads 3, and the structure where the PTC device A did not short-circuit was taken. This PTC device A provided the composition cell which used it for rechargeable batteries, such as primary batteries, such as a lithium cell, a manganese dry battery, and an alkaline manganese battery, a nickel-cadmium battery, nickel hydride, a silver storage battery, and improved the safety as a power supply.

[0003]

[Problem(s) to be Solved by the Invention]However, a thermal shock is added to the PTC device A, when the PTC device A has the unusual energization from the outside, the PTC device operates, the temperature of PTC element 1 rises, the excessive current from the outside is removed and temperature returns to ordinary temperature. When this phenomenon is repeated, generating and in being extreme, lack of insulating resin will crack the insulating resin 4, depending on conditions, the PTC device A will be in a short condition, and it becomes impossible to maintain the safety of a cell.

[0004]This invention solves such a technical problem and an object of this invention is to improve environmental stress-proof nature, such as the heat resistance of a PTC device, and thermal shock resistance.

[0005]

[Means for Solving the Problem]This invention is solved by using polyparaxylylene system resin which is excellent in heat resistance, thermal shock resistance, and mechanical properties as resin coating of a PTC device.

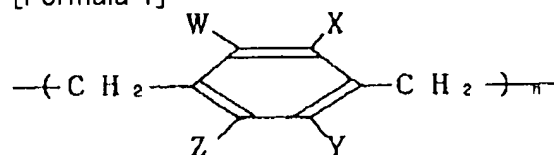
[0006]

[Function]Polyparaxylylene system resin has a chemical constitution formula shown in (** 1). This thing excels the conventional ABS plastics in heat resistance, and mechanical strengths, such as

abrasion resistance and shock nature, also have physical properties 2 to 3 times stronger. Therefore, the function of a PTC device is maintainable over a long period of time.

[0007]

[Formula 1]



W, X, Y, Z; 置換基

[0008]

[Example] Next, the example of this invention is described. It is a sectional view of the PTC device A which uses polyparaxylylene system resin, and drawing 1 (a) is the top view, and (b) made polyethylene resin distribute the impalpable powder of conductors, such as carbon black and graphite, by a PTC element, and it carries out the molding process of 1 to a sheet tens of micro thick. 2 is a metal plate which consists of nickel with a thickness of tens of micro stuck to said PTC element by pressure, a Ni alloy, Cu, and a Cu alloy. 3 is usually made of the same raw material as the metal plate 2 with the metal lead board electrically connected to said metal plate 2. 4 is polyparaxylylene system resin in the insulating resin which coated the portion except the lead takeoff connection of said metal lead board.

[0009] Drawing 2 - drawing 4 are a front view of the lithium cell for cameras provided with the PTC device A shown in drawing 1, a right side view, and a top view. In a figure, 5 is a battery receiving case. B is the manganese dioxide lithium cell of a cartridge, used two of these and has electrically connected the cell by methods, such as resistance welding and laser welding, with the PTC device A. 6 and 7 are the terminal holes of right and a negative electrode established in the pars basilaris ossis occipitalis of the case 5. 8 is a lid which blockades the upper opening of the case 5, it is made of the same construction material as a case, and uniting of a lid and the case is carried out with ultrasonic welding or a binder. What uses conventional insulating resin about the PTC device of this invention constituted as mentioned above, The incidence rate of the crack and omission of coating resin when the low temperature side makes every 4 hours and a total of 8 hours the temperature atmosphere whose temperature by the side of -20 ** and an elevated temperature is 100 ** with one cycle, respectively and does a thermal shock test was compared. The result is shown in (Table 1). The number of test pieces was made into 500 pieces, respectively.

[0010]

[Table 1]

	1 0 c / s	5 0 c / s	1 2 0 c / s
本発明品 ポリパラキシレン系樹脂	0 %	0 %	0 %
比較品(1) シリコン樹脂	3.4 %	9.8 %	13 %
比較品(2) ウレタン樹脂	18 %	66 %	100 %

[0011]

[Effect of the Invention] As mentioned above, environmental stress-proof nature, such as the heat resistance of a PTC device and thermal shock resistance, is made as for what is depended on this invention to a very firm thing by using polyparaxylylene system resin for the raw material of insulating resin so that more clearly than (Table 1). For this reason, the reliability and the safety of a

PTC device and a composition cell are maintainable over a long period of time.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application]This invention relates to the composition cell provided with the PTC device and the PTC device.

[Translation done.]

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PRIOR ART

[Description of the Prior Art]Conventionally, an over-current, The energization in which what is a resistor of tens milli ohms in a normal state is unusual from the outside as for the PTC device constituted by sticking by pressure the metal plate which connected metal leads to the PTC element (POSITIVE TEMPERATURE COEFFICIENT) which is a heating protective element, When it becomes a tens of ohms resistor by a rise in heat in the inside of a short time and external load changes into a normal state, it has the feature which returns to the original low resistance object. The thickness of PTC element 1 in order to maintain low resistance, as shown in drawing 1 as a structure of a PTC element For this reason, about 15-40micro, The thickness of the metal plate 2 was about 30-100micro, it covered with the insulating resin 4 grade except for the lead takeoff connection of the metal leads 3, and the structure where the PTC device A did not short-circuit was taken. This PTC device A provided the composition cell which used it for rechargeable batteries, such as primary batteries, such as a lithium cell, a manganese dry battery, and an alkaline manganese battery, a nickel-cadmium battery, nickel hydride, a silver storage battery, and improved the safety as a power supply.

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EFFECT OF THE INVENTION

[Effect of the Invention]As mentioned above, environmental stress-proof nature, such as the heat resistance of a PTC device and thermal shock resistance, is made as for what is depended on this invention to a very firm thing by using polyparaxylylene system resin for the raw material of insulating resin so that more clearly than (Table 1). For this reason, the reliability and the safety of a PTC device and a composition cell are maintainable over a long period of time.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, a thermal shock is added to the PTC device A, when the PTC device A has the unusual energization from the outside, the PTC device operates, the temperature of PTC element 1 rises, the excessive current from the outside is removed and temperature returns to ordinary temperature. When this phenomenon is repeated, generating and in being extreme, lack of insulating resin will crack the insulating resin 4, depending on conditions, the PTC device A will be in a short condition, and it becomes impossible to maintain the safety of a cell.

[0004]This invention solves such a technical problem and an object of this invention is to improve environmental stress-proof nature, such as the heat resistance of a PTC device, and thermal shock resistance.

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MEANS

[Means for Solving the Problem]This invention is solved by using polyparaxylylene system resin which is excellent in heat resistance, thermal shock resistance, and mechanical properties as resin coating of a PTC device.

[Translation done.]

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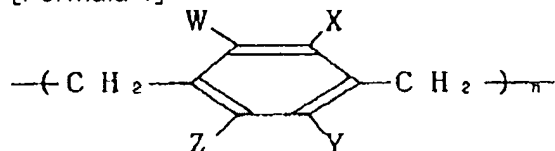
- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
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OPERATION

[Function]Polyparaxylylene system resin has a chemical constitution formula shown in (** 1). This thing excels the conventional ABS plastics in heat resistance, and mechanical strengths, such as abrasion resistance and shock nature, also have physical properties 2 to 3 times stronger. Therefore, the function of a PTC device is maintainable over a long period of time.

[0007]

[Formula 1]



W , X , Y , Z ; 置 換 基

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EXAMPLE

[Example]Next, the example of this invention is described. It is a sectional view of the PTC device A which uses polyparaxylylene system resin, and drawing 1 (a) is the top view, and (b) made polyethylene resin distribute the impalpable powder of conductors, such as carbon black and graphite, by a PTC element, and it carries out the molding process of 1 to a sheet tens of micro thick. 2 is a metal plate which consists of nickel with a thickness of tens of micro stuck to said PTC element by pressure, a Ni alloy, Cu, and a Cu alloy. 3 is usually made of the same raw material as the metal plate 2 with the metal lead board electrically connected to said metal plate 2. 4 is polyparaxylylene system resin in the insulating resin which coated the portion except the lead takeoff connection of said metal lead board.

[0009]Drawing 2 - drawing 4 are a front view of the lithium cell for cameras provided with the PTC device A shown in drawing 1, a right side view, and a top view. In a figure, 5 is a battery receiving case. B is the manganese dioxide lithium cell of a cartridge, used two of these and has electrically connected the cell by methods, such as resistance welding and laser welding, with the PTC device A. 6 and 7 are the terminal holes of right and a negative electrode established in the pars basilaris ossis occipitalis of the case 5. 8 is a lid which blockades the upper opening of the case 5, it is made of the same construction material as a case, and uniting of a lid and the case is carried out with ultrasonic welding or a binder. What uses conventional insulating resin about the PTC device of this invention constituted as mentioned above, The incidence rate of the crack and omission of coating resin when the low temperature side makes every 4 hours and a total of 8 hours the temperature atmosphere whose temperature by the side of -20 ** and an elevated temperature is 100 ** with one cycle, respectively and does a thermal shock test was compared. The result is shown in (Table 1). The number of test pieces was made into 500 pieces, respectively.

[0010]

[Table 1]

	1 0 c / s	5 0 c / s	1 2 0 c / s
本発明品 * リハ [®] ラキシレン系樹脂	0 %	0 %	0 %
比較品(1) シリコン樹脂	3.4 %	9.8 %	13 %
比較品(2) ウレタン樹脂	18 %	66 %	100 %

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1](a) The sectional view of the PTC device of this invention

(b) The top view

[Drawing 2]The front view of the composition cell provided with the PTC device of this invention

[Drawing 3]The right side view of the composition cell provided with the PTC device of this invention

[Drawing 4]The top view of the composition cell provided with the PTC device of this invention

[Description of Notations]

1 PTC element

2 Metal plate

3 Metal lead

4 Insulating resin (polyparaxylylene system resin)

5 Battery receiving case

6 and 7 Terminal hole

8 Lid

A PTC device

B Cell

[Translation done.]

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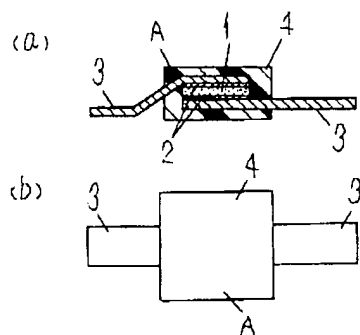
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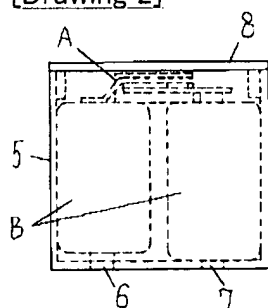
DRAWINGS

[Drawing 1]

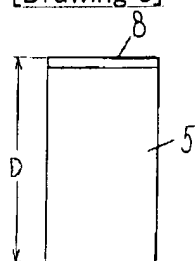
1---PTC素子
2---金属板
3---金属製リード
4---絶縁樹脂
A---PTC装置



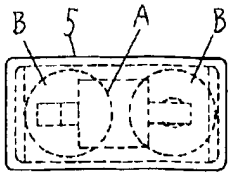
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-057721

(43)Date of publication of application : 03.03.1995

(51)Int.Cl.

H01M 2/34

(21)Application number : 05-195727

(71)Applicant : MATSUSHITA ELECTRIC IND CO
LTD

(22)Date of filing : 06.08.1993

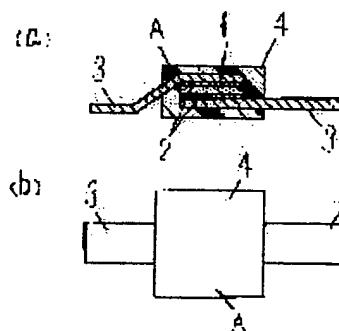
(72)Inventor : IZUMIKAWA TOSHIHIKO
OO FUMIO

(54) PTC DEVICE AND CONSTITUTION BATTERY HAVING PTC DEVICE

(57)Abstract:

PURPOSE: To enhance the heat resistance and thermal shock resistance of a PTC device and to maintain safety and reliance of a battery and a constitution battery using the PTC device for a long term.

CONSTITUTION: In a PTC device A, the surface except for a part from which a metallic lead 3 is taken out is covered with a heat resistant polyparaxylene resin 4. The heat resistance of the PTC device is increased. The reliability and safety of a constitution battery using the PTC device A are enhanced.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of
rejection][Kind of final disposal of application other than
the examiner's decision of rejection or

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CLAIMS

[Claim(s)]

[Claim 1] PTC equipment characterized by covering the front face with poly PARAKI silylene system resin except for the lead takeoff connection of a metal lead in a metal plate and the PTC equipment which comes to carry out the laminating of the metal lead to vertical both sides of a PTC component.

[Claim 2] The configuration cell equipped with the PTC equipment characterized by connecting between cells the PTC equipment which covered the front face with poly PARAKI silylene system resin except for the lead takeoff connection of a metal lead in a metal plate and the PTC equipment which comes to carry out the laminating of the metal lead to vertical both sides of a PTC component.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the configuration cell equipped with PTC equipment and PTC equipment.

[0002]

[Description of the Prior Art] in the normal state, the PTC equipment which consist of the former by stick by pressure the metal plate which connected the metal lead to the PTC component (POSITIVE TEMPERATURE COEFFICIENT) which be an overcurrent and a heating protection component have the description which return to the original low resistor, when what be the resistor of dozens milli ohms become a dozens of ohms resistor by the unusual energization from the outside, and the temperature rise in the inside of a short time and an external load change into a normal condition. For this reason, as shown in drawing 1 as structure of a PTC component, in order to maintain low resistance, the structure where thickness of the PTC component 1 was set to about 30-100micro, and was covered with insulating resin 4 grade except for the lead takeoff connection of the metal lead 3, and PTC equipment A did not short-circuit the thickness of about 15-40micro and a metal plate 2 in it was taken. This PTC equipment A offered the configuration cell which used it for rechargeable batteries, such as primary cells, such as a lithium cell, a manganese dry battery, and an alkali manganese dry battery, and a nickel-cadmium battery, nickel hydrogen, a silver battery, and raised the safety as a power source.

[0003]

[Problem(s) to be Solved by the Invention] However, when PTC equipment A has the unusual energization from the outside, PTC equipment operates, the temperature of the PTC component 1 rises, the excessive current from the outside is removed and temperature returns to ordinary temperature, a thermal shock joins PTC equipment A. When this phenomenon was repeated, it was the thing it becomes impossible to maintain the safety of a cell by lack of insulating resin arising [a crack] to insulating resin 4 in being extreme, generating and, and PTC equipment A being in a short condition to it depending on conditions.

[0004] This invention solves such a technical problem and aims at raising environmental stress-proof nature, such as the thermal resistance of PTC equipment, and thermal shock resistance.

[0005]

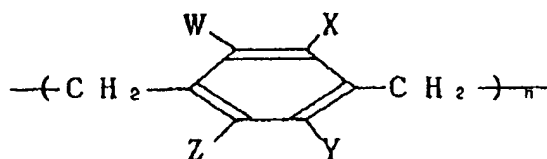
[Means for Solving the Problem] This invention is solved by using the poly PARAKI silylene system resin which is excellent in thermal resistance, thermal shock resistance, and mechanical physical properties as a resin coat of PTC equipment.

[0006]

[Function] Poly PARAKI silylene system resin has the chemical structure type shown in (** 1). From the conventional ABS plastics, this thing is excellent in thermal resistance, and has 2 to 3 times stronger physical properties also for mechanical strengths, such as abrasion resistance and impact nature. Therefore, the function of PTC equipment is maintainable over a long period of time.

[0007]

[Formula 1]



W, X, Y, Z ; 置換基

[0008]

[Example] Next, the example of this invention is explained. It is the sectional view of the PTC equipment A which used poly PARAKI silylene system resin, drawing 1 (a) is the top view, (b) made polyethylene resin distribute the impalpable powder of conductors, such as carbon black and graphite, with a PTC component, and 1 carries out molding processing for it at the sheet whose thickness is dozens of micro. 2 is a metal plate which consists of nickel with a thickness of dozens of micro stuck to said PTC component by pressure, nickel alloy, Cu, and a Cu alloy. 3 is usually made of the same material as a metal plate 2 with the metal lead plate electrically connected to said metal plate 2. 4 is poly PARAKI silylene system resin by the insulating resin which coated the part except the lead takeoff connection of said metal lead plate.

[0009] Drawing 2 - drawing 4 are the front view of the lithium cell for cameras equipped with the PTC equipment A shown in drawing 1, a right side view, and a top view. In drawing, 5 is a cell receipt case. B is the diacid-ized manganese lithium cell of a cartridge, used two of these and has connected the cell by approaches, such as resistance welding and laser welding, electrically with PTC equipment A. 6 and 7 are the terminal holes of forward and a negative electrode established in the pars basilaris ossis occipitalis of a case 5. 8 is a lid which blockades up opening of a case 5, it is made of the same quality of the material as a case, and the junction unification of a lid and the case is carried out with ultrasonic welding or a binder. The incidence rate of the crack and omission of coating resin when a low temperature side carries out a thermal shock test to the temperature ambient atmosphere whose temperature by the side of -20 degrees C and an elevated temperature is 100 degrees C about what used conventional insulating resin about the PTC equipment of this invention constituted as mentioned above by making every 4 hours and a total of 8 hours into 1 cycle, respectively was compared. The result is shown in (Table 1). In addition, the number of test pieces was made into 500 pieces, respectively.

[0010]

[Table 1]

	10 c / s	50 c / s	120 c / s
本発明品 ポリパラキシレン系樹脂	0 %	0 %	0 %
比較品(1) シリコン樹脂	3.4 %	9.8 %	13 %
比較品(2) ウレタン樹脂	18 %	66 %	100 %

[0011]

[Effect of the Invention] As mentioned above, environmental stress-proof nature, such as the thermal resistance of PTC equipment and thermal shock resistance, is made as for what is depended on this invention to a very firm thing by using poly PARAKI silylene system resin for the material of insulating resin so that more clearly than (Table 1). For this reason, the dependability and the safety of PTC equipment and a configuration cell are maintainable over a long period of time.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] (a) The sectional view of the PTC equipment of this invention

(b) The top view

[Drawing 2] The front view of the configuration cell equipped with the PTC equipment of this invention

[Drawing 3] The right side view of the configuration cell equipped with the PTC equipment of this invention

[Drawing 4] The top view of the configuration cell equipped with the PTC equipment of this invention

[Description of Notations]

1 PTC Component

2 Metal Plate

3 Metal Lead

4 Insulating Resin (Poly PARAKI Silylene System Resin)

5 Cell Receipt Case

6 Seven Terminal hole

8 Lid

A PTC equipment

B Cell

[Translation done.]

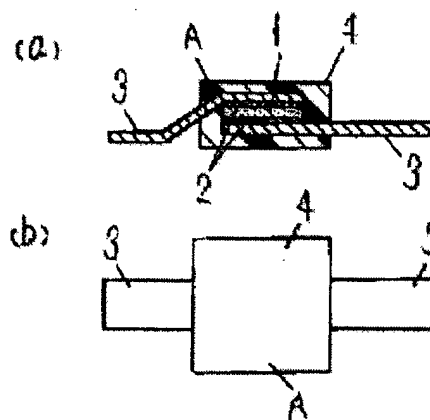
PTC DEVICE AND CONSTITUTION BATTERY HAVING PTC DEVICE

Publication number: JP7057721
Publication date: 1995-03-03
Inventor: IZUMIKAWA TOSHIHIKO; OO FUMIO
Applicant: MATSUSHITA ELECTRIC IND CO LTD
Classification:
- **International:** H01M2/34; H01M2/20; (IPC1-7): H01M2/34
- **European:**
Application number: JP19930195727 19930806
Priority number(s): JP19930195727 19930806

Report a data error here

Abstract of JP7057721

PURPOSE:To enhance the heat resistance and thermal shock resistance of a PTC device and to maintain safety and reliance of a battery and a constitution battery using the PTC device for a long term. **CONSTITUTION:**In a PTC device A, the surface except for a part from which a metallic lead 3 is taken out is covered with a heat resistant polyparaxylene resin 4. The heat resistance of the PTC device is increased. The reliability and safety of a constitution battery using the PTC device A are enhanced.



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(11)特許出願公開番号

特開平7-57721

(43)公開日 平成7年(1995)3月3日

(51)Int.Cl.⁶

H 0 1 M 2/34

識別記号

庁内整理番号

F I

技術表示箇所

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(71)出願人 000005821

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産業株式会社内

(74)代理人 弁理士 小鍛治 明 (外2名)

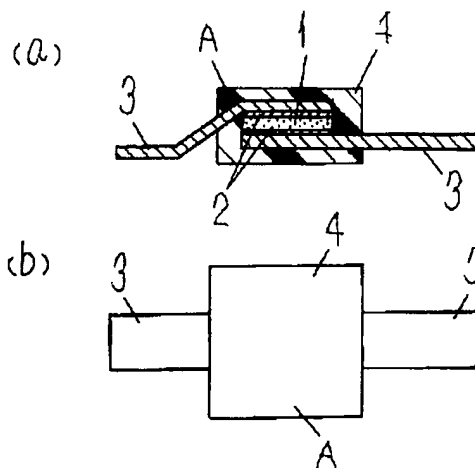
(54)【発明の名称】 PTC装置およびPTC装置を備えた構成電池

(57)【要約】

【目的】 本発明は、PTC装置の耐熱性、耐熱衝撃性の向上を図り、PTC装置を使用した電池、構成電池の安全性、信頼性を長期にわたって維持できることを目的とする。

【構成】 PTC装置Aにおいて金属製リード3のリード取り出し部を除いて、その表面を耐熱性のポリバラキシリレン系樹脂4で被覆することによりPTC装置の耐熱性を向上させることが可能となり、このPTC装置Aを使用した構成電池の信頼性、安全性の向上を図る。

1---PTC素子
2---金属板
3---金属製リード
4---絶縁樹脂
A---PTC装置



【特許請求の範囲】

【請求項1】 PTC素子の上下両面に金属板、金属製リードを積層してなるPTC装置において金属製リードのリード取り出し部を除いて、その表面をポリバラキシリレン系樹脂で被覆したことを特徴とするPTC装置。

【請求項2】 PTC素子の上下両面に金属板、金属製リードを積層してなるPTC装置において金属製リードのリード取り出し部を除いて、その表面をポリバラキシリレン系樹脂で被覆したPTC装置を電池間に接続したことを特徴とするPTC装置を備えた構成電池。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、PTC装置およびPTC装置を備えた構成電池に関するものである。

【0002】

【従来の技術】従来より、過電流、加熱保護素子であるPTC素子 (POSITIVE TEMPERATURE COEFFICIENT) に金属製リードを接続した金属板を圧着して構成されるPTC装置は通常状態では数十ミリオームの抵抗体であるものが外部からの異常な通電、温度上昇により短時間のうちに数十オームの抵抗体となり外部負荷が正常な状態になったときに元の低抵抗体に復帰する特徴を持っている。このためPTC素子の構造としては図1に示すように低抵抗を維持するためPTC素子1の厚みを15~40μ程度、金属板2の厚みを30~100μ程度とし金属製リード3のリード取り出し部を除いて絶縁樹脂4等で被覆し、PTC装置Aがショートしないような構造を採っていた。このPTC装置Aはリチウム電池、マンガン乾電池、アルカリマンガン乾電池等の一次電池や、ニ*

*ニッケルカドミウム電池、ニッケル水素、銀蓄電池等の二次電池に使用して電源としての安全性を高めた構成電池を提供していた。

【0003】

【発明が解決しようとする課題】しかしながら、PTC装置Aに外部からの異常な通電がありPTC装置が作動したとき、PTC素子1の温度が上昇し、外部からの過大電流が取り除かれ温度が常温に戻った場合、PTC装置Aに熱衝撃が加わる。この現象が繰り返されたとき絶縁樹脂4に亀裂が発生、極端な場合には絶縁樹脂の欠落が生じ、条件によってはPTC装置Aがショート状態となり、電池の安全性を維持できなくなるものであった。

【0004】本発明は、このような課題を解決するもので、PTC装置の耐熱性、耐熱衝撃性等の耐環境ストレス性を高めることを目的とする。

【0005】

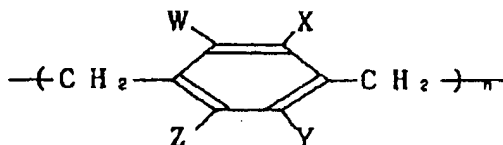
【課題を解決するための手段】本発明は、PTC装置の樹脂被膜として耐熱性、耐熱衝撃性、機械的物性に優れたポリバラキシリレン系樹脂を使用することにより、解決するものである。

【0006】

【作用】ポリバラキシリレン系樹脂は(化1)に示す化学構造式を有している。このものは従来のABS樹脂より耐熱性に優れ、耐磨耗性、衝撃性等の機械的強度も2~3倍強い物性を持っているものである。従って長期にわたりPTC装置の機能を維持できる。

【0007】

【化1】



W, X, Y, Z: 置換基

【0008】

【実施例】次に本発明の実施例を説明する。図1(a)はポリバラキシリレン系樹脂を使用したPTC装置Aの断面図であり、(b)はその平面図で、1はPTC素子でポリエチレン樹脂にカーボンブラック、グラファイト等の導電体の微粉末を分散させたもので厚みが数十μのシートに成型加工したものである。2は前記PTC素子に圧着した数十μの厚みのNi, Ni合金、Cu, Cu合金からなる金属板である。3は前記金属板2に電気的に接続された金属製リード板で通常金属板2と同一素材でできている。4は前記金属製リード板のリード取り出し部を除いた部分をコーティングした絶縁樹脂でポリバラキシリレン系樹脂である。

【0009】図2~図4は図1に示すPTC装置Aを備えたカメラ用リチウム電池の正面図、右側面図、平面図である。図において、5は電池収納ケースである。Bは筒形の二酸化マンガンリチウム電池で、これを2個使用し、電池をPTC装置Aで電気的に抵抗溶接、レーザー溶接等の方法で接続している。6, 7はケース5の底部に設けられた正・負極の端子孔である。8はケース5の上部開口部を閉塞する蓋であり、ケースと同様の材質でできており、蓋とケースは超音波溶着あるいは接着材等で接合一体化されている。以上のように構成された本発明のPTC装置について従来の絶縁樹脂を使用したものとを、低温側が-20℃、高温側の温度が100℃の温度雰囲気それぞれ4時間ずつ、合計8時間を1サイクル

ルとして熱衝撃テストを行ったときのコーティング樹脂 *した。
 の亀裂・脱落の発生率を比較した。その結果を(表1) 【0010】
 に示す。なお、テストピースの数はそれぞれ500個と* 【表1】

	10 c / s	50 c / s	120 c / s
本発明品 ポリパラキシレン系樹脂	0 %	0 %	0 %
比較品(1) シリコン樹脂	3.4 %	9.8 %	13 %
比較品(2) ウレタン樹脂	18 %	66 %	100 %

【0011】

10 図

【発明の効果】以上、(表1)より明かなように、本発明によるものは、絶縁性樹脂の素材にポリパラキシレン系樹脂を使用することにより、PTC装置の耐熱性、耐熱衝撃性等の耐環境ストレス性を極めて強固なものにできる。このためPTC装置ならびに構成電池の信頼性・安全性を長期にわたって維持できる。

【図面の簡単な説明】

【図1】(a) 本発明のPTC装置の断面図

(b) その平面図

【図2】本発明のPTC装置を備えた構成電池の正面図

【図3】本発明のPTC装置を備えた構成電池の右側面

【図4】本発明のPTC装置を備えた構成電池の平面図

【符号の説明】

- 1 PTC素子
- 2 金属板
- 3 金属製リード
- 4 絶縁樹脂(ポリパラキシレン系樹脂)
- 5 電池収納ケース
- 6, 7 端子孔
- 8 蓋
- 20 A PTC装置
- B 電池

【図1】

【図2】

【図3】

【図4】

